

HORT 201 - Plant propagation
REVISED Laboratory Exercise 9

Grafting Willow, Tomato and Potato

References: Text pp. Grafting – 461-467, 492-496 (Note illustrations).

Key words and terms from CD:

Bark graft, callus, cambium, graft incompatibility, graft union, graft wax, grafting, incompatibility, understock, waxes (grafting).

Objectives:

1. To develop proficiency in grafting willow using a modified bark graft.
2. To develop proficiency grafting herbaceous plants.
3. To learn some basic principles in handling grafts.

Introduction:

Grafting is the art of joining parts from different plants so they unite and grow as one composite plant. The part making the root system of the new plant is called the **rootstock** and that part making the shoots and leaves is called the **scion**. A graft which successfully heals and produces a growing plant is called a '**take**'. Grafting is used to propagate clones difficult to propagate by other asexual means, to obtain the advantages of a particular rootstock system, to produce a salable plant more quickly, to change varieties of established plants, or to repair damaged trees.

The art of grafting is very old, and many techniques and variations of these techniques have been developed to meet different situations. In this course we will learn the basic, most commonly used methods.

Sharpening knives

One of the most important tasks of grafting is to closely match up the cambial layers of the rootstock and scion. This requires sharp, clean cuts from a sharp knife. Competent grafting required proficiency in sharpening knife edges.

To sharpen knives: The blue stone is coarse, put a little water on it and hold the knife at an angle 20-25 degrees and push forward along the stone. If there is a bevel on both sides of the blade, switch sides every six strokes. If only one side of the knife is beveled, sharpen the beveled side at an angle while the flat side should be sharpened flat on the stone. Use the red, fine-grained stone afterwards, alternating sides on every stroke to put a fine hone on the blade. A well-sharpened knife should hold an edge for many days' work.

PART A - TOP GRAFTING MINIATURE WILLOWS

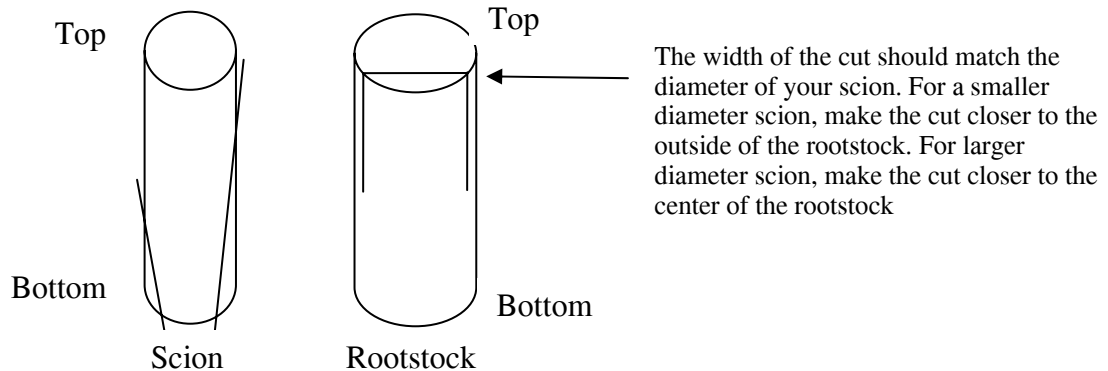
INTRODUCTION:

Top grafted miniature patio trees are becoming more popular as consumers look for small trees in pots that can be used on decks and patios. These same plants can be planted in the ground to provide unique additions to the landscape. Such patio trees are created by grafting small and dwarf shrubs, broad-leaved evergreens and conifers onto tall rootstocks of related species.

A number of grafting techniques are used to create top grafted plants, but we will use a modified bark graft technique for this exercise. A number of dwarf shrub willows grafted onto tall stream willow, *Salix smithiani*, rootstocks have recently become popular. The willow, *Salix integra* 'Hakura Nashiki' will be used as stock material in this exercise.

PROCEDURE:

1. Each student needs to obtain the following:
 - a. two *Salix smithiani* rootstocks that have been cut to 24-36 inches in length.
 - b. two one-year-old scion wood of *Salix integra* 'Hakura Nishiki',
2. Cut the terminal bud and the top several inches off the rootstock.
3. Remove all lateral buds off the rootstock with a grafting knife as demonstrated by the instructor. This removes buds that would otherwise grow out as lateral shoots on the
4. Cut your scion to a length of six inches. Verify that the diameter at the top of your rootstock is at least equal to or larger than the diameter at the base of your scion rootstock.
5. Make cuts to the rootstock and scion as demonstrated by the laboratory instructor and illustrated below. Make sure that the single cut in the rootstock is the same width as the diameter of the scion so that cambiums of both will match each other. This is a modified bark graft.



6. Insert the scion into the rootstock making sure cambiums match on at least one side (ideally on both sides).
7. Tightly wrap the graft union with a grafting rubber. Be sure the entire union is covered.

8. Dip the entire scion and union into melted grafting wax making sure the entire union is covered.
9. Allow the grafting wax to cool for a few minutes by placing the graft on the rack provided.
10. Take your graft to greenhouse zone 21 and insert the base of the rootstock into the potting media in a 6-inch pot. Push the stem all the way to the bottom. Water in your pot.
11. The rootstock will form roots in 7 to 10 days, at the same time the graft union is healing. You are responsible for periodically removing buds that sprout from the rootstock during the healing process. Once healed, the scion buds will grow through the wax covering and give rise to the 'head' of your miniature tree.
12. Shoots arising from the scion will need to be pruned 2 to 3 times before the end of the semester to result in a compact head.

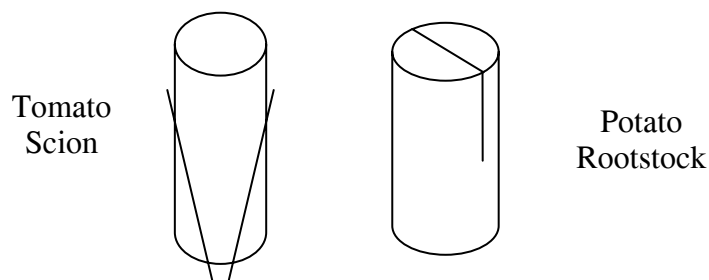
PART B - POTATO/TOMATO GRAFTING

INTRODUCTION:

Potato and tomato can be grafted together successfully because both belong to the same plant family, Solanaceae. Because these two species are graft compatible, we can have tomato fruits on the above-ground part of this composite plant and potato tubers on the underground part. Grafting is a labor intensive propagation procedure, thus 'topato' plants will never be commercially profitable. The tomato is a determinate tomato variety called 'Best Boy' and has a bushy, not viney habit. The potato is an organically-grown Idaho potato purchased at Marsh.

PROCEDURE:

1. Get a tomato and potato plant that hopefully have the same width of stem.
2. Take the potato plant first. Chose the stem that you are going to graft onto. Try to match the stem width to the tomato stem, but do not make the graft too close to the ground nor too high up. Cut out all other shoots of the potato that may be in the pot and cut all the leaves off the potato stem you are using.
3. Prepare the tomato next to hopefully keep the maximum amount of moisture in both plants. Remove extra leaves on the tomato so that only a little tuft is left at the top.
4. Cut down the middle of the potato stem no matter the width of the tomato. Cut the tomato tip off the plant right above the cotyledon leaves (if the plant is really short). Slice off opposite sides of the tomato stem at the base to get a flat-head screwdriver shape. (Diagram below)



5. Place the tomato at the edge of potato stem so that at least one side of the cambiums match. Seal the graft with Parafilm.
6. Cover the plant by putting two stakes in the pot, spray some water into a clear plastic bag, and place the bag over the graft and pot. Use a rubber band around the pot to hold the plastic tight.
7. Place the pots as instructed under heavy shade cloth for a week to seal the graft.
8. If you plan to keep your plants they will need transplanted into your garden at the end of the semester if you want tubers and fruits.

PART C - Lab 5 data collection and observations. Please record data and observations for rooting and growth of the herbaceous perennials on the attached sheet. **Data sheets are due in class Mar. 19th.**

PART D – Lab 6 data for rooting and growth of specialized structures. Please record data and observations on the attached sheet. **Data sheets are due in class Mar. 19th.**

NOTE: Plant material may be planted up to keep on Bench 1 until the end of the semester or discarded. Plants you would like to keep should be clearly identified with your name. Discarded soil and plant material should be placed into non-transgenic waste cans. Do not over-fill the cans. Stack pots and flats neatly beside the cans.

PART E – Plant Redbud/Honeylocust seeds stratified 10 weeks

Obtain your lab group's redbud/honeylocust seeds that have been cold stratifying for the past 10 weeks. Plant the seeds 10 seeds per row in the germination flat. Use separate rows for the different species and treatments of scarification. When this flat is full it will be placed in Zone 21.

Lab 1 batch 3 seeds scored?

DATA SHEET FOR LAB 5
March 18, 2008

Your name: _____

Circle Lab Section # 1 2 3

Record your observations and results of experiments.

Root Cuttings:

Dicentra spectabilis (Bleeding heart) – indicate the percent of root cuttings which produced shoots for each of the following:

Proximal end up – _____

Distal end up - _____

Which cutting orientation resulted in larger plants? _____

Phlox paniculata (Garden Phlox) – actively growing fine roots

Indicate the percent of root cuttings that produced shoots - _____

Observations-

Stem Tip Cuttings:

Mentha spicata (spearmint) –

Indicate the percent of stem tip cuttings which rooted: _____

Observations

Stolon cuttings:

Mentha spicata (spearmint) –

Indicate the percent of stolon cuttings which produce shoots: _____

Observations

Divisions:

Heuchera sanguinea ‘Ruby Bells’ (Coral Bells);

Indicate the percent of divisions that produced new shoots: _____

Achillea millefolium ‘Apple Blossom’ (yarrow)

Indicate the percent of divisions that produced new shoots: _____

DATA SHEET FOR LAB 6

March 18, 2008

Your name: _____

Circle Lab Section # 1 2 3

Part A: Bulblet formation on scales (scaling) – Easter lily

Percent of mature scales forming bulblets: _____

Percent of inner scales forming bulblets: _____

Part B: Mature plant formation from offsets – garlic

Percent of garlic cloves forming offsets: _____

Part C: Basal cuttage of bulbs – hyacinth, daffodil and grape hyacinth

Percent of bulbs producing offsets from basal cottage (scoring) : _____

Part D: Bulb cuttings – daffodil

Percent of bulbs producing offsets from twin scaling: _____

Percent of bulbs producing offsets from sectioning: _____

Part E: Corms and cormels – crocus

Percent of corms producing offsets: _____

Part F: Rhizomes - ginger

Percent of rhizomes producing roots: _____

Percent of rhizomes producing shoots: _____

Part G: Tubers – potato

Percent of seed potatoes producing shoots: _____

Part H: Crown division of tuberous roots – sweet potato

Percent of sweet potatoes producing shoots: _____